

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1-105. (Canceled)

106. (Currently amended) An isolated recombinant protein comprising a variant form of SEQ ID NO:38, said variant form having no more than 29 amino acids other than position 214 of SEQ ID NO:38 which are different from the amino ~~acids described~~ acid sequence set forth in SEQ ID NO:38, wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

107. (Currently amended) The recombinant protein of claim 106, wherein Xaa in SEQ ID NO:38 is an amino acid selected from the group consisting of Cys, Ala and ~~Asp~~ Asn.

108. (Previously Presented) The recombinant protein of claim 106, wherein Xaa in SEQ ID NO:38 is Ala.

109. (Currently amended) The recombinant protein of claim 106, wherein the recombinant protein comprises a variant form of SEQ ID NO:40 wherein said variant form comprises no more than 28 amino acids other than positions 214 and 354 of SEQ ID NO:40 which are different from the amino ~~acids described~~ acid sequence set forth in SEQ ID NO:40.

110. (Currently amended) The recombinant protein of claim 106, wherein the recombinant protein comprises a variant form of SEQ ID NO:41 wherein said variant form comprises no more than 27 amino acids other than positions 214, 232 and 354 of SEQ ID NO:41 which are different from the amino ~~acids described~~ acid sequence set forth in SEQ ID NO:41.

111. (Currently amended) The recombinant protein of claim 106, wherein the recombinant protein comprises a variant form of SEQ ID NO:42 wherein said variant form comprises no more than 26 amino acids other than positions 214, 215, 232 and 354 of SEQ ID

NO:42 which are different from the amino acids described acid sequence set forth in SEQ ID NO:42.

112. (Previously Presented) An isolated nucleic acid sequence which encodes the recombinant protein according to claim 106.

113. (Previously Presented) A vector comprising the nucleic acid sequence according to claim 112.

114. (Previously Presented) An isolated cell transformed with the vector according to claim 113.

115. (Previously Presented) The cell according to claim 114 which is a prokaryotic cell.

116. (Previously Presented) The cell according to claim 114 which is a plant cell.

117. (Previously Presented) A plant comprising the cell according to claim 116.

118. (Previously Presented) In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 106 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.

119. (Previously Presented) A kit comprising the protein according to claim 106.

120. (Previously Presented) The kit according to claim 119 which further comprises luciferin.

121. (Previously Presented) An isolated recombinant protein comprising SEQ ID NO:38, wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

122. (Currently amended) The recombinant protein of claim 121, wherein Xaa in SEQ ID NO:38 is an amino acid selected from the group consisting of Cys, Ala and ~~Asp~~ Asn.

123. (Previously Presented) The recombinant protein of claim 121, wherein Xaa in SEQ ID NO:38 is Ala.

124. (Previously Presented) An isolated recombinant protein comprising SEQ ID NO:40, wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

125. (Previously Presented) An isolated recombinant protein comprising SEQ ID NO:41, wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

126. (Previously Presented) An isolated recombinant protein comprising SEQ ID NO:42, wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

127. (Previously Presented) An isolated nucleic acid sequence which encodes the recombinant protein according to claim 121.

128. (Previously Presented) An isolated nucleic acid sequence which encodes the recombinant protein according to claim 124.

129. (Previously Presented) An isolated nucleic acid sequence which encodes the recombinant protein according to claim 125.

130. (Previously Presented) An isolated nucleic acid sequence which encodes the recombinant protein according to claim 126.

131. (Previously Presented) A vector comprising the nucleic acid sequence according to claim 127.

132. (Previously Presented) A vector comprising the nucleic acid sequence according to claim 128.

133. (Previously Presented) A vector comprising the nucleic acid sequence according to claim 129.

134. (Previously Presented) A vector comprising the nucleic acid sequence according to claim 130.

135. (Previously Presented) An isolated cell transformed with the vector according to claim 131.

136. (Previously Presented) An isolated cell transformed with the vector according to claim 132.

137. (Previously Presented) An isolated cell transformed with the vector according to claim 133.

138. (Previously Presented) An isolated cell transformed with the vector according to claim 134.

139. (Previously Presented) The cell according to claim 135 which is a prokaryotic cell.

140. (Previously Presented) The cell according to claim 136 which is a prokaryotic cell.

141. (Previously Presented) The cell according to claim 137 which is a prokaryotic cell.

142. (Previously Presented) The cell according to claim 138 which is a prokaryotic cell.

143. (Previously Presented) The cell according to claim 135 which is a plant cell.

144. (Previously Presented) The cell according to claim 136 which is a plant cell.

145. (Previously Presented) The cell according to claim 137 which is a plant cell.

146. (Previously Presented) The cell according to claim 138 which is a plant cell.

147. (Previously Presented) A plant comprising the cell according to claim 143.

148. (Previously Presented) A plant comprising the cell according to claim 144.

149. (Previously Presented) A plant comprising the cell according to claim 145.

150. (Previously Presented) A plant comprising the cell according to claim 146.

151. (Previously Presented) In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 121 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.

152. (Previously Presented) In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising

contacting the recombinant protein according to claim 124 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.

153. (Previously Presented) In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 125 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.

154. (Previously Presented) In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 126 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.

155. (Previously Presented) A kit comprising the protein according to claim 121.

156. (Previously Presented) A kit comprising the protein according to claim 124.

157. (Previously Presented) A kit comprising the protein according to claim 125.

158. (Previously Presented) A kit comprising the protein according to claim 126.

159. (Previously Presented) The kit according to claim 155 which further comprises luciferin.

160. (Previously Presented) The kit according to claim 156 which further comprises luciferin.

161. (Previously Presented) The kit according to claim 157 which further comprises luciferin.

162. (Previously Presented) The kit according to claim 158 which further comprises luciferin.